

A Work Project, presented as part of the requirements for the Award of a Masters Degree in Management from the NOVA – School of Business and Economics.

The Firm Delocalization Decision

An empirical investigation

Vitorino Alberto Mello Gomes Oliveira

1516

A Project carried out under the supervision of

Professor José Mata

June 3rd, 2015

The Firm Delocalization Decision

An empirical investigation

Abstract

In the current paper, the determinants of firm international relocation decision in twenty-six European countries during the period 2004-2014 are analyzed. We demonstrate, at light of three different but complementary theories that neoclassical, behavioural and institutional ‘push’ factors have an impact in a firm decision-making process. Findings support that firm size, access to a global network, foreign capital, and negative internal growth in the workforce induce firm relocation. On the other hand, the degree of sunk assets has a negative effect on the probability of relocation. Delocalization decisions are also sector-dependent with low-tech manufacturing firms paying high salaries relocating abroad with a greater likelihood.

JEL Classification: F21, F22, F23

Keywords: Delocalization; Multinationals; Manufacturing; Salary

Acknowledgements

I gratefully acknowledge my supervisor Professor José Mata for the great support and constructive suggestions during this work project. Additional gratitude is expressed to António Silva, from Bureau van Dijk, John Hurley and the ERM team, from Eurofound, Professor Paulo Faroleiro, Marta Lopes, and my colleagues from Nova School of Business & Economics, for the kind support and motivation.

Introduction

The economic landscape of a country is shaped by the birth of new firms, their expansion, decline and closure. Geographical movements of these enterprises influence spatial redistribution of economic activity and employment, stressing the importance of the study of firm relocation and delocalization. Relocation of firms is hereby defined as movements within the same country's borders, while delocalization encompasses firm migration (both partial and total) abroad. This analysis' purpose is to enlighten and contribute to the understanding of the firm delocalization decision, having a wide span of implications for spatial planning policy, employment and foreign direct investment attraction (Arthuis, 1993; Brainard and Riker, 1997; Sleuwaegen and Pennings, 2006).

Studies on firm location and migration have been published since the 1950s, especially in countries such as the United Kingdom, the Netherlands, Germany, Belgium, France and Italy (see Pellenbarg, *et al.*, 2002). Most have been looking at the optimal location choice or at determinants of capital investment, without clearly distinguishing expansion from relocation – meaning the “move of a manufacturing process from one place to another” (Mucchielli and Saucier, 1997).

There are important contributions to the understanding of this topic. According to the literature, main reasons for business relocation decision include business expansion (Klaassen and Molle, 1983; Hayter, 1997); cost savings through wage differentials, scale economies, and energy prices (Chan *et al.*, 1995); or the need to optimize access to raw materials and energy sources (McCann, 2001). Others have sustained that previous restructuring events and the need to adapt to new market conditions are equally important drivers (Mucchielli and Saucier, 1997; Brouwer *et al.*, 2004).

In fact, earlier firm relocation studies were based on aggregated data, focusing on the relocation over time, space and by sector. Belderbos and Sleuwaegen (1996) and Belderbos (1997) analyze Japanese investments in developed economies as a result of a trade reform impacting electronics exports. At a macro level, individual firms may be encouraged to move by government policy, but considerably less attention is paid to the decision-making process of individuals on the micro level (Brouwer *et al.*, 2004).

Research on firm migration has developed arguments to support this decision-making process, around internal factors (as firm size), external factors (as market size) and location factors (as region characteristics) (see Lloyd and Dicken, 1992). These will affect a firm's decision to relocate. One may even distinguish "push" factors, which trigger the need to move from one's present location (van Wissen, 2000), from "pull" factors, which then attract firms to an optimal site (Erickson and Wasylenko, 1980; Holl, 2004; Capasso *et al.*, 2011). For instance, labour-intensive firms in Belgium may be 'pushed' to relocate to foreign countries as they work against the comparative advantage of Belgium in large scale capital intensive activities, and may be 'pulled' to move to neighbouring countries, by government policy through subsidies and investment promotion (Sleuwaegen and Pennings, 2000; 2006).

The decision to move is deemed to depend upon intrinsic characteristics of the firm, more than side-related factors, such as of the region it is located in (van Dijk and Pellenbarg, 2000). In a second-step, the decision of where to move is found to be stirred by the characteristics of the potential regions of the firm's consideration set (Kronenberg, 2013).

The current paper will focus on the first-step analysis of firm-specific factors ("push" factors), driving the decision to delocalize. Employing a unique dataset on firms'

relocation behaviour in twenty-six European countries, between 2002 and 2014, this study contributes to the existing literature with a specific outlook on the topic, encompassing the period of the largest EU enlargement to Central and Eastern Europe in 2004 and 2007.

The study will focus on the migration behaviour of manufacturing firms – since representing over 80% of all registered delocalizations in the past decade in Europe –, although distinguishing between firms in knowledge-intensive/high-tech and less knowledge-intensive/low-tech manufacturing (cf. Kronenberg, 2013), by this means taking into account credible intersectoral specificities regarding firms' decisions to relocate.

While there is growing literature on firm relocation within one specific country and from one particular country abroad (see studies at detailed municipality level by Rosenthal and Strange 2003; Arauzo-Carod 2005), there is thus far seldom analyses on firm delocalization regarding multiple countries at the European level. To my knowledge, only Konings and Murphy (2006) have yet analysed evidence from multinational employment relocation intra-European regions. Based on the premise that multinationals are 'footloose' (Caves, 1996; Görg and Strobl, 2003), the latter envisioned to understand the impact of the opening up of Central and Eastern Europe in the 1990s on firm migration from the European Union, finding evidence for employment substitution between manufacturing parent firms and their affiliates in North EU countries, but none between low-wage regions in the EU and Central and Eastern Europe.

This study explores the determinants of firm migration in Europe, using individual data on firm and delocalization characteristics from an initial sample of nearly 800 observations.

The paper is structured as follows. The following section provides a theoretical outline of the research and formulates hypotheses of determinants of firm delocalization. Then, we introduce the data employed for the analysis, specify the empirical model and define the variables used. Subsequently, one presents and discusses the empirical results that test the hypotheses, and finally conclude, highlighting guidelines for future research.

Literature and Hypotheses

Delocalization and Offshoring

Most studies differentiate complete from partial relocation. The first can be defined as “the movement of an establishment from one location to another” (Brouwer *et al.*, 2004), being mostly adopted by single site firms and tending to enact short-distance relocation in order to preserve current network of suppliers and workforce (Kemper and Pellenbarg, 1997). The second involves the creation of a new unit, which takes over part of the operations of a prevailing business unit (Schmenner, 1980), being prominent in the case of multi-plant firms, which can benefit from production spatial deployment. Operations can be subcontracted to a company within the enterprise group, in what is mentioned as “captive offshoring”, or to a non-affiliated company, designated as “offshoring”. In the context of this study, all cross-border (complete or partial) transfers of activity (delocalization or offshoring) will be taken into account.

Location Theory

Changes in markets, preferences of consumers, environmental or competitive regulations and technological progress create new situations to which firms are

constantly adapting. This adjustment process very often has a spatial dimension. Literature has approached the topic of optimal location choice, through different lenses, which may be defined as the neoclassical, the behaviour and the institutional theories. Earlier studies generally valued more factors which increase attractiveness of a new location site (so-called “pull” factors). However, location theories can also take into account the first step of triggering a relocation decision through “push” factors (Pellenbarg *et al.*, 2002). Consequently, one ought to present respective overview of the three different theories.

Neoclassical Framework

The *neo-classical location theory* posits that under the assumptions of rationality and perfect information, firms seek to maximize profits, among others by choosing an optimal location (Nakosteen and Zimmer, 1987). Explanatory normative models focusing on *location factors*, such as transportation and labor costs, or market size, have tried to understand spatial margins for profitability in current and potentially new locations, in what has been considered the “new economic geography” (Krugman, 1997; Fujita *et al.*, 2001). In fact, the main factors driving firm relocation are cost-reduction factors, leading to a rational choice of *the* least-cost location (Weber, 1929). The approach then argues that this optimal location is fixed in an equilibrium situation, meaning that relocation is not necessary; however, firm internal factors and changes in the environment may shape different cost and revenue surfaces, and thus change the mentioned spatial margins for profitability. A firm may be driven to relocate, because it no longer is in a profitable location (‘push factor’), as it may be attracted by a more profitable one (‘pull factor’). Yet, the neoclassical framework focuses mainly on cost factors that are location-related, while firm internal factors are not taken into

consideration (such as firm expansion or “growth, which is the most common factor inducing relocation” – Pellenbarg *et al.*, 2002) The mentioned assumptions do not actually take into account internal dynamics of firms under imperfect information and uncertainty, disregarding the impact of relocation costs¹, which are to be explored exhaustively in the following behavioural approach.

Behavioural Approach

Under bounded rationality and limited information, firms enter into sub-optimal outcomes, rather than pursue maximum profit (Simon, 1955; Cyert and March, 1963). The *behavioural location theory* highlights *internal factors*, such as firm age and size, which are relevant and impactful in the location decision-making process of the firm (Hayter, 1997). It then focuses on firm abilities and perceptions over the neoclassical cost-reduction factors and particularly on relocation costs as barriers to move (and delocalize): firms as decision makers are no more rational *homo economicus*, but consider limited options to relocate to. They act as ‘satisficers’, which stick to a first solution that shows to be ‘satisfactory’ (*idem, ibidem*). The process of decision-making is then highly sequential, with (1) the decision whether to move or not; (2) the search for alternative locations; (3) their evaluation; and (4) the choice of the new location. To explain the first-stage decision to relocate, studies have hence analysed factors that may cause inertia to move – Clark and Wrigley (1997) analyse different forms of sunk costs that may inhibit relocation decisions: (i) set-up sunk costs include initial capital investment, such as advertising to enter customers considerations set or training of labour for a new production unit; (ii) accumulated sunk costs comprehend ‘normal costs of doing business’ (Kessides, 1991); and (iii) exit sunk costs, which could be pension

¹ Relocation costs comprise “the costs of the real-estates site search and acquisition, the dismantling, moving, and reconstruction of existing facilities, the construction of new facilities and the hiring and training of new labour employed” (McCann, 2001).

entitlements of labour. Although costs that are sunk are, by definition, hardly recoverable, they do show to have an impact on firms decision to move. Thus, once set to move, firms are pushed to nearer places, or “more familiar or easier to imagine than distance places”, because it is their perception of reality that matters (their conceptual “mental maps”), more than reality in itself (Pellenbarg *et al.*, 2002).

Institutional Theory

In order to complement these approaches of the firm as a decision-maker, the *institutional location theory* considers the dynamic social environment where the enterprise is embedded: cultural institutions, networks and value systems constitute the framework for economic activity and therefore shape firm location decisions (Amin, 1995). Multiple agents, including firms, suppliers, governments, labour unions, among other stakeholders, are taken into account in the negotiation process of various firm production factors, such as location, taxes and subsidies, wages, among others. *External factors*, such as market size, previous restructuring events (expansion, mergers, or take-overs, e.g.), competitive pressure and cooperation play a central role in defining market rules, institutional intervention and firm decisions, such as the one of firm delocalization (Martin 2000). In this approach, the emphasis is therefore on the interaction between firms, more than on behavior of individual companies: long-term economic relationships (trade networks, e.g.), or institutional support in a region can have a crucial impact in defining firm’s optimal investment strategies, which are tightly linked to their location decisions (Amin, 2001). Among other factors influencing delocalization, one may consider firm age, as older firms are more embedded in their environment, showing therefore lower mobility (Brouwer *et al.*, 2004): this

embeddedness should be translated into long-term trust relationships with other agents, which are anchored in spatial proximity (Granovetter 1973).

Subsequent hypotheses considerations are proposed on the basis of the firm relocation literature appraised previously, on internal, external and location decision factors.

1. Size

According to the behavioural theory, one major internal factor that drives firm relocation is firm size, since larger operational units will tend to face significantly more moving costs and hence incur in less frequent delocalization decisions (Kronenberg, 2013). According to Mason (1980), smaller firms would tend to move more frequently, because (1) they ought to have less capital investments requirements to write-off; (2) they are prone to repeated small locational adjustments; and (3) they likely face more redevelopment issues, with less accommodating expansion flexibility, than larger companies. Van Dijk and Pellenbarg (2000) showed significant results for firm relocation decisions within the Netherlands, in large single-site firms (+200 employees); while regarding international relocation, Brouwer *et al.* (2004) posits that only larger firms (+1500 employees) show to be most immobile. Measures of size seem in fact to work as proxies for the degree of capital sinking. Therefore, our first hypothesis is:

Hypothesis 1a. Firms with larger sunk costs show lower international mobility.

However, once considering larger multi-plant firms, Pennings and Sleuwaegen (2000) posit that those can profit more from international firm relocation, especially when variable costs are low and firms are more profitable, showing better financial capacity to absorb the adjustment cost (Caves, 1996). Size *per se* can actually mean that the firm is more flexibly able to delocalize part of its operations and adjust its production to multiple optimal locations. This leads us to contemplate the following hypothesis:

Hypothesis 1b. Larger firms are more likely to relocate part of their operations abroad.

2. Multinationality

In view of the multinational investment literature, belonging to a global network enhances flexibility in the relocation decision of a firm. Incurring sunk costs and relocation costs are lower (to none) for firms shifting production within an established international network, while there seem to be more barriers for uni-national firms for which delocalization constitutes “their first foreign investment decision” (Pennings and Sleuwaegen, 2000). Therefore, in light of the institutional theory, firms which have already invested abroad or that are themselves foreign branches, should be more prompt to relocate internationally, when settling to a new location. In fact, multinationals not only respond to changes in the host country, as also in all other alternative locations, where they operate. The behavioural theory then supports that multinationals should have more comprehensive information on different foreign locations, than a corresponding purely domestic firm, being more likely to consider relocation alternatives abroad (Konings and Murphy, 2006). Hence:

Hypothesis 2. Firms belonging to a multinational group are more likely to delocalize.

3. Ownership

Beyond the effect of multinational networks, one ought to understand the impact of ownership nationality over the propensity to delocalize. In fact, within a multinational group, one may distinguish firms located in their owners home-country from the ones located abroad. Indeed, ownership advantages show to be relevant, as foreign firms have been seen to adapt faster to opportunities abroad, than their domestic counterparts (Dunning, 1993). Regarding foreign-owned multinationals, volatility seems even to increase with age: from a sample of Portuguese firms, Mata and Freitas (2012) posit that

‘footlooseness’ of foreign multinationals increases with time, as firms contemplate more attractive relocation options abroad. Following the work on international relocation, foreign firms should possess ownership advantages to thrive abroad, which Pennings and Sleuwaegen (2000) identify, for instance, as transferable technological advantages, which could be diverted in different locations. Consequently, the following hypothesis may be considered:

Hypothesis 3. Foreign capital drives international firm mobility.

4. Change

Earlier papers, under the institutional theory approach, have claimed “the spatial adjustment process to firm growth in relation to the external environment” is a major explanatory factor of international firm relocation (Brouwer *et al.*, 2004). Firms experiencing internal growth (either positive or negative) can be seen as the number of employees differing from its ‘optimum’ and therefore, potentially, requiring a change in location (Kronenberg, 2013). These internal changes could be predicting the spatial adjustment to new supply conditions (a drop in demand could trigger excess production capacity to be reassigned to foreign markets, e.g.), but the need for new premises could also be boosted by external growth: mergers, acquisitions and takeovers are often followed by firms’ relocations (van Vilsteren and Wever, 1999). So, the next hypothesis reads as follows:

Hypothesis 4. Internal growth (positive or negative) induces international relocation.

5. Sector and Salary

Consistent with the neoclassical theory, and particularly of the cost-minimizing literature, the impact of wages paid upon the propensity to relocate is complex and depends on the type of industry: in low-tech industries, firms typically use a relatively

unskilled labour force and do not benefit much from using more skilled labour. As a consequence, firms that pay high wages (e.g., due to institutional conditions, such as fixed legal minimum wage or high social security contributions) confront relatively higher costs from which can be optimized, as the firm may relocate to lower wage countries to save on costs. In contrast, employing a skilled labour force is a key advantage in high-tech industries. In such industries, high wages may be an indication of a highly skilled labour, which may be difficult to find and recruit elsewhere: therefore, high wages may be negatively related to the likelihood of relocation. Indeed, Kronenberg (2013) found that low-tech/less knowledge-intensive firms relocate with greater probability if they have high wages, while high-tech/knowledge-intensive firms are less likely to move with higher wages. We thus formulate the following hypothesis:

Hypothesis 5. For low-tech manufacturing firms, the propensity to relocate to another country increases with the average salary received by the firm's employees, whereas it decreases for high-tech manufacturing firms.

The following table (Table 1) summarizes key concepts from each location theory and assigns variables of interest and control to its most direct theoretical framework.

Table 1. Location theories and factors influencing firm relocation

Theoretical framework	Key concepts (<i>factors</i>)	Variables (most direct classification)
Neoclassical theory	Market situation, cost-reduction (<i>Location factors</i>)	* Production factors and costs (salary, e.g.) * Country of location * Sector of economic activity
Behavioural theory	Information, abilities, perceptions, mental maps (<i>Internal factors</i>)	* Firm size and sunk costs * Firm age
Institutional theory	Networks, negotiation, trust, social capital, culture and values (<i>External factors</i>)	* Firm growth (positive and negative; merger; acquisition; take-over) * International networks * Ownership advantages

Source: adapted from Brouwer, Mariotti and van Ommeren, 2004.

Method

Data Sources

The sample of firms to be analyzed was obtained by merging two data sets.

Firstly, a unique sample of media-covered restructuring announcements by firms that reported the intention to delocalize or offshore operations (partially or totally) from one country to another, with announced creation or reduction of at least 100 jobs, or affecting at least 10% of a site with minimum workforce of 250 employees. The European Restructuring Monitor (ERM) covers twenty-six European countries² in the period from 2002 to 2014. With nearly 800 identified cases, involving over 270,000 job losses, the database is “the only European source that allows us to give estimates of the share of large scale restructuring job loss accounted for by offshoring” (Eurofound, 2013).

Secondly, a commercial data source, marketed by Bureau van Dijk under the brand “Amadeus”, consists of medium and large sized European firms, covering the years 2002-2013, satisfying the following criteria: (1) number of employees equal or greater than 100 for at least one of the years under consideration; (2) NACE sector pertaining to the 10-33 interval (rev. 2), corresponding to all manufacturing firms; (3) guaranteeing firms which have survived along the years are included alongside with firms having exited or gone insolvent in any year. Coverage of the data depends on accounting processes and different national legislation and procedures, but the set of over 100,000 medium and large manufacturing companies is fairly representative of the European economic tissue.

² Austria, Belgium, Bulgaria, Czech Republic, Denmark, Estonia, Finland, France, Germany, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, and the United-Kingdom. Croatia, Cyprus and Greece were also covered by the database (since 2013, 2005 and 2002, respectively), but no observation was registered under the mentioned criteria.

Data Description

Delocalization has showed to affect more extensively blue-collar and lower-skilled workers than high-skilled ones in host (sending) countries, both in terms of wage cuts and the likelihood of job loss (Eurofound, 2013). Offshoring events account for a minor part of large-scale restructuring job losses, with less than 12% in every quarter since 2003. What is more, the 2008-2009 economic crisis has considerably depressed the rate of offshoring in Europe: it peaked until 2007 (within a range of 6%–12%) and has lowered since (to a range between 2.5%–6%). Offshoring is then deemed to be positively correlated with the economic expansion. 2008 onwards, in the post-crisis period, the share of delocalization and offshoring job loss out of the total number for all restructuring events (including closures, expansion, mergers and acquisitions, relocation) has converged in the EU countries, as the share for EU15 countries dropped more than six times and the negligible share of growing NMS³ economies finally reached their neighbours' critical level. Other differences arise between different Member States: larger countries register larger restructuring events (with larger-scale international relocations), but the share of offshoring is deemed significantly higher for smaller EU15 economies, such as Ireland, Portugal and Denmark (over 15%). Most offshored jobs in Europe (55%) remain in Europe, especially for firms whose relocation is unique within the exposed timeframe (87%): 45% of offshored jobs destination is the EU, and particularly NMS (capturing more than two thirds of jobs in the EU). Asian countries, such as China and India, capture around a fourth of offshored jobs.

As mentioned, manufacturing sectors encompass the large majority of offshored jobs in all European countries, except for the UK, where the services sector is mostly affected –

³ New Member States: Bulgaria, Croatia, Cyprus, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Romania, Slovakia and Slovenia.

moreover, the largest country-to-country delocalization relationship is UK-India (with almost one third of all UK's offshoring events). There is nonetheless no evidence in the European database in the 2004-2014 period for any shift from manufacturing to services jobs delocalization. One can however observe different trends: (1) a broad trend for a decline in the share of services and a rise in the one of high and medium-high technology manufacturing sectors (HT and MHT); (2) foreign ownership accounts for an increasing share of offshoring in the post-crisis (from nearly half to over two thirds of total cases); and (3) there is an increase in the percentage of *reshoring* events (delocalization to the home-capital county), within the lower number of offshoring. More than a quarter (28%) of offshoring job losses in non-domestic, EU-owned firms were the consequence of episodes (with Italian and German owners most likely to reshore their international subsidiaries).

Following the merge of the databases, the dataset consists of 366,250 observations, of which 426 firms (1.2%) relocated to another municipality between 2004 and 2014. The analysis is carried out controlling for firms in high-tech (HT), medium-high-tech manufacturing (MHT), and low-tech manufacturing (LT) (adapted from Kronenberg, 2013). Classification of the 2-digit NACE sectors into these four categories is exposed in Table 2. The study is undertaken for the complete dataset, and for each of the previous subsamples.

Table 2. Classification of manufacturing sectors (capital-intensive)

Classification*	Knowledge industry**	NACE Sectors (Rev. 2 codes - 2-digit level)
High-tech manufacturing	Knowledge-intensive	21 and 26
Medium-high-tech manufacturing	Knowledge-intensive	20 and 27-30
Medium-low-tech manufacturing	Less-knowledge intensive	19, 22-25 and 33
Low-tech manufacturing	Less-knowledge intensive	10-18 and 31-32

* Technology classification of manufacturing industries: OECD (2013), with NACE 35 reclassified as medium-high-tech.

**Knowledge industry: Kronenberg 2013

The Empirical Model

The decision to relocate activities is modeled by means of a logistic model relating the probability to relocate in the period 2004–2014 to a set of explanatory variables x_i . The probability of relocation (1 for migration, 0 otherwise) is calculated for each observation, as $F(x_i'\beta)$, where $F = \frac{\exp(\cdot)}{1+\exp(\cdot)}$ and β is the vector of coefficients (Greene, 1997). Descriptive statistics and precise definitions of the explanatory variables are provided in Table 3.

Table 3. Descriptive statistics and definitions of independent variables

	Mean	Standard deviation	Definition
AGE	26,24	29,18	The age of the firm, since the incorporation year.
SIZE	5,16	1,08	The logarithm of the total number of employees included in the company's payroll.
SUNK	0,30	0,25	The ratio of the fixed tangible assets (buildings, machinery and equipment) over the total assets (fixed and current).
DMN	0,12	0,33	Domestic Multinational company. Dummy variable which is 1 if the company belongs to a group of multinationals with more than one foreign subsidiary and if the company's global ultimate owner is from the same nationality as the company. The global ultimate owner of a company is its shareholder with the highest direct or total % of ownership.
FOREIGN	0,34	0,47	Dummy variable which is 1 if the company's global ultimate owner's nationality is foreign.
SALARY	3,17	1,01	The logarithm of the average salary of the company, measured as the ratio of all costs with employees (including pension costs) by the number of employees.
MHT	0,26	0,44	Medium-high technology sectors. Dummy variable which is 1 if the company belongs to one medium-high technology manufacturing sector (20 and 27-30).
HT	0,06	0,24	High technology sectors. Dummy variable which is 1 if the company belongs to one high technology manufacturing sector (21 and 26).
INCREASE5	0,54	0,50	Dummy variable which is 1 if the company's total number of employees increased by more than 5% from the previous year to the current one.
DECREASE5	0,15	0,36	Dummy variable which is 1 if the company's total number of employees decreased by more than 5% from the previous year to the current one.

AGE is used as a control variable, as well as dummies for 10 years, 23 countries and 2 industries. Among the explanatory variables, company size is indicated as SIZE (natural logarithm of the number of employees); the degree of investment sink is proxied by SUNK (ratio of the sunk tangible assets⁴ to total assets); the dummies DMN and FOREIGN state 1 for firms belonging to a domestic multinational group and foreign-owned firms, respectively, and 0 otherwise.

⁴ Apart from plant, machinery and equipment, the tangible assets include land and buildings, furniture and vehicles, leasing and other similar rights, assets under construction, and other tangible assets.

Furthermore, average salary of employees within the firm is measured, by SALARY, as the natural logarithm of a firm's employee average daily salary (in euros); and finally, we include two explanatory variables, which measure positive (INCREASE) and negative (DECREASE) internal growth between the two years anteceding the observational year (as a change in natural logarithm of a firm's number of employees).

Results

Consistent with the exposed literature and stated hypothesis, the results of the logit model (see Table 4) indicate larger firms are deemed to show a higher propensity for delocalization, but firms with higher sunk costs should, on the opposite, refrain from international relocation. As multi-plant firms contemplate more operations to redeploy, they do also envision *proximity* at a larger (than national) scale, when considering alternative sources of factors of production, energy or new consumer markets, potentially establishing a complex multinational operating network and 'thinking global'. One may also distinguish the effect of geographical dimension of firms and financial muscle, from an increased proportion of sunk tangible assets on a company's balance sheet: indeed, a higher degree of investment sink seems to predict a lower probability of delocalization, confirming sunk costs as a barrier to international mobility (Caves and Porter, 1977). Supporting hypothesis one and according to the behavioural theory, sunk costs should in fact be a factor that affects firms' decision-making, meaning they are most immobile (Pellenbarg, *et al.*, 2002).

Considering the multinational delocalization literature, the dummy variable DMN suggests a positive impact on the relocation decision of a domestic multinational network, and particularly if the firm is financed with foreign capital, not rejecting our second hypothesis. When a company is part of a global network, production can

straightforwardly be shifted within the holding structure without incurring higher restructuring costs when situation proves critical in one of its firms, compared with purely domestic counterparts. On the contrary, a uni-national company without a network more often incurs in sunk costs, and hence faces a lower probability to relocate part of its operations abroad.

Table 4. Results of the logistic regression: maximum likelihood estimation of delocalization

	(1)	(2)	(3)
AGE	-0,0003 (0,0024)	-0,0009 (0,0025)	-0,0009 (0,0025)
SIZE	0,8288 *** (0,0477)	0,8414 *** (0,0480)	0,8410 *** (0,0480)
SUNK	-2,5368 *** (0,4621)	-2,4723 *** (0,4626)	-2,4801 *** (0,4650)
DMN	0,5094 * (0,2644)	0,5295 ** (0,2643)	0,5074 * (0,2629)
FOREIGN	1,2312 *** (0,2227)	1,2291 *** (0,2227)	1,1809 *** (0,2220)
SALARY	0,2613 (0,1643)	0,2128 (0,1628)	0,6154 *** (0,2086)
MHT	0,2260 (0,1560)	0,2351 (0,1563)	2,0242 ** (0,8224)
HT	0,8568 *** (0,1910)	0,8577 *** (0,1919)	3,5091 *** (0,9046)
INCREASE5		-0,0469 (0,1728)	-0,0548 (0,1729)
DECREASE5		0,7364 *** (0,1604)	0,7281 *** (0,1604)
SALARY x MHT			-0,4962 ** (0,2212)
SALARY x HT			-0,7233 *** (0,2418)
_cons	-14,6492 *** (0,7879)	-14,6404 *** (0,7986)	-16,0390 *** (0,9309)
<i>Log-likelihood</i>	-1578,2	-1565,9	-1561,1

N= 366.250. All regressions include 2 industry dummies, 23 country dummies and 10 year dummies. Standard deviation in parentheses. ***, **, and * indicate significance at 1%, 5% and 10%, respectively.

Besides belonging to a global network, a firm with foreign capital is also more prone to relocate internationally, which supports our third hypothesis. Birkinshaw *et al.* (2006) findings indicate that relocation of multinational headquarters is actually more likely when foreign equity share is higher, which is in line with our findings for relocation of multinational manufacturing operations. To further support this perspective, Tsetsekos and Gombola (1992) argue for an ‘easiness’ to redeploy foreign plants versus domestic ones, as closing (total reshoring) a foreign plant “need not signify firm-wide problems”, while a domestic closing could indicate “impending firm deterioration”.

Regarding our fourth hypothesis, there is a significant positive impact on delocalization for firms having experienced an expressive decrease in their workforce, while the result for positive growth is not statistically significant. The event of a labour restructuring seems henceforth to be more prominent in predicting international relocation, as firms need to readjust their operations processes abroad – the creation of foreign jobs should therefore be more likely for manufacturing firms which have first cut at home. Further research could indeed try to isolate the type of growth (positive and negative) in a more incisive manner, by understanding whether drivers of internal growth (on-site expansion, and branching, e.g.) and external growth (merger, acquisition, take-over) do show significantly different impacts on the firm delocalization decision (Brouwer *et al.*, 2004).

Finally, when considering the impact of the average salary on the propensity to relocate across different manufacturing sectors, one may conclude that indeed higher salaries in low-technology sectors should be proxied for lower relative competitiveness and the need for an international restructuring to correct for cost-disadvantage, showing confidence in finding an equivalently (or more) competent workforce abroad. However,

in line with Kronenberg's (2013) results for firm relocation in the Netherlands, relocation decisions in high-tech manufacturing are largely not affected by firm-specific labour costs. In the neoclassical framework and as a partial support to our latest hypothesis, these results suggest that while employee's salary indubitably represents a cost that a firm seeks to minimize, they may also stand for the value and competitiveness of a firm's workforce.

Conclusion

Relocation of tasks and operations from one country to another has been indicated as an important means to develop competitiveness of firms within a "globalized network economy" (Sleuwaegen and Pennings, 2006). As the results of this study suggest, the understanding of this challenging international movement of firms can be sustained by three different but complementary perspectives: the neoclassical, the behavioural and the institutional theories.

Using a unique dataset from European firms' delocalization decisions within a large time span (from 2004 to 2014), one has been able to understand that firm size, multinational networks, foreignness of capital and negative firm growth are significantly increasing the probability for a firm to delocalize; while the proportion of sunk assets on the left side of the balance sheet inhibits firm international relocation. Finally, regarding inter-sectorial differences, higher salaries in low manufacturing sectors do show to predict a higher propensity to delocalization.

The relevance of external growth factors can however be further investigated to better enlighten the determinants of international firm relocation. Moreover, further relocation should explore "pull" factors of firms which have already decided to move ('Where do firms go?') and explore the in-depth motives behind this decision.

Appendix

Table 5. Correlation matrix of dependent and independent variables

	DELOCALIZATION	AGE	SIZE	SUNK	DMN	FOREIGN	SALARY
DELOCALIZATION	1						
AGE	0,00	1					
SIZE	0,03	0,12	1				
SUNK	-0,01	-0,10	0,01	1			
DMN	0,01	0,10	0,12	-0,15	1		
FOREIGN	0,01	-0,06	0,13	-0,03	-0,31	1	
SALARY	0,01	0,26	0,05	-0,37	0,20	0,11	1
MHT	0,01	0,02	0,08	-0,15	0,07	0,09	0,14
HT	0,02	0,00	0,04	-0,10	0,04	0,06	0,10
INCREASE5	0,00	-0,09	-0,02	0,00	-0,01	-0,01	-0,05
DECREASE5	0,01	0,02	-0,09	0,00	-0,02	-0,01	-0,01
SALARY_MHT	0,01	0,05	0,07	-0,19	0,10	0,10	0,27
SALARY_HT	0,01	0,01	0,04	-0,12	0,05	0,06	0,15

	MHT	HT	INCREASE5	DECREASE5	SALARY_MHT	SALARY_HT
MHT	1					
HT	-0,16	1				
INCREASE5	0,00	0,03	1			
DECREASE5	-0,02	-0,01	-0,38	1		
SALARY_MHT	0,96	-0,15	0,00	-0,01	1	
SALARY_HT	-0,15	0,97	0,02	-0,01	-0,15	1

Table 6. Statistical Classification of Economic Activities in the European Community, Rev. 2 (2008)

- 10 Manufacture of food products
- 11 Manufacture of beverages
- 12 Manufacture of tobacco products
- 13 Manufacture of textiles
- 14 Manufacture of wearing apparel
- 15 Manufacture of leather and related products
- 16 Manufacture of wood and cork, except furniture; manufacture of articles of straw and plaiting materials
- 17 Manufacture of paper and paper products
- 18 Printing and reproduction of recorded media
- 19 Manufacture of coke and refined petroleum products
- 20 Manufacture of chemicals and chemical products
- 21 Manufacture of basic pharmaceutical products and pharmaceutical preparations
- 22 Manufacture of rubber and plastic products
- 23 Manufacture of other non-metallic mineral products
- 24 Manufacture of basic metals
- 25 Manufacture of fabricated metal products, except machinery and equipment
- 26 Manufacture of computer, electronic and optical products
- 27 Manufacture of electrical equipment
- 28 Manufacture of machinery and equipment n.e.c.
- 29 Manufacture of motor vehicles, trailers and semi-trailers
- 30 Manufacture of other transport equipment
- 31 Manufacture of furniture
- 32 Other manufacturing
- 33 Repair and installation of machinery and equipment

References

- Amin, A. (2001).** Moving on: institutionalism in economic geography. *Environment and Planning A*, 33(7), 1237-1242.
- Amin, A., & Thrift, N. (1995).** Globalization, institutions, and regional development in Europe. Oxford University Press.
- Arauzo Carod, J. M. (2005).** Determinants of industrial location: An application for Catalan municipalities*. *Papers in Regional Science*, 84(1), 105-120.
- Arthuis, J. (1993).** Rapport d'information sur les délocalisations hors du territoire national des activités industrielles et de services. Sénat.
- Belderbos, R. A. (1997).** Antidumping and tariff jumping: Japanese firms' DFI in the European Union and the United States. *Weltwirtschaftliches Archiv*, 133(3), 419-457.
- Belderbos, R., & Sleuwaegen, L. (1996).** Japanese firms and the decision to invest abroad: business groups and regional core networks. *The review of Economics and Statistics*, 214-220.
- Birkinshaw, J., Braunerhjelm, P., Holm, U., & Terjesen, S. (2006).** Why do some multinational corporations relocate their headquarters overseas?. *Strategic Management Journal*, 27(7), 681-700.
- Brainard, S. L., & Riker, D. A. (1997).** Are US multinationals exporting US jobs? (No. w5958). National bureau of economic research.
- Brouwer, A. E., Mariotti, I., & Van Ommeren, J. N. (2004).** The firm relocation decision: An empirical investigation. *The Annals of Regional Science*, 38(2), 335-347.
- Capasso, M., Cefis, E., & Frenken, K. (2011).** Spatial differentiation in industrial dynamics: A core-periphery analysis based on the Pavitt-Miozzo-Soete Taxonomy (No. 2011/02). LEM Working Paper Series.

- Caves, R. E.** (1996). Multinational enterprise and economic analysis. Cambridge university press.
- Caves, R. E., & Porter, M. E.** (1977). From entry barriers to mobility barriers: Conjectural decisions and contrived deterrence to new competition*. The Quarterly Journal of Economics, 241-261.
- Chan, S. H., Gau, G. W., & Wang, K.** (1995). Stock market reaction to capital investment decisions: Evidence from business relocations. Journal of Financial and Quantitative Analysis, 30(01), 81-100.
- Clark, G. L., & Wrigley, N.** (1997). Exit, the firm and sunk costs: reconceptualizing the corporate geography of disinvestment and plant closure. Progress in Human Geography, 21(3), 338-358.
- Cyert, R. M., & March, J. G.** (1963). A behavioral theory of the firm. Englewood Cliffs, NJ, 2.
- Erickson, R. A., & Wasylenko, M.** (1980). Firm relocation and site selection in suburban municipalities. Journal of Urban Economics, 8(1), 69-85.
- Eurofound** (2013), Monitoring and managing restructuring in the 21st century, Publications Office of the European Union, Luxembourg.
- Fujita, M., Krugman, P. R., & Venables, A. J.** (2001). The spatial economy: Cities, regions, and international trade. MIT press.
- Görg, H., & Strobl, E.** (2003). 'Footloose' multinationals?. The Manchester School, 71(1), 1-19.
- Granovetter, M. S.** (1973). The strength of weak ties. American journal of sociology, 1360-1380.

- Hayter, R.** (1997). The dynamics of industrial location: the factory, the firm, and the production system (pp. 61-89). Chichester: Wiley.
- Holl, A.** (2004). Start-ups and relocations: Manufacturing plant location in Portugal*. Papers in Regional Science, 83(4), 649-668.
- Kessides, I. N.** (1991). Entry and market contestability: the evidence from the United States. Entry and market contestability: An international comparison, 23-48.
- Klaassen, L. H., & Molle, W.** (1983). Industrial mobility and migration in the European Community. Gower Publishing Company.
- Konings, J., & Murphy, A. P.** (2006). Do multinational enterprises relocate employment to low-wage regions? Evidence from European multinationals. Review of World Economics, 142(2), 267-286.
- Kronenberg, K.** (2013). Firm relocations in the Netherlands: Why do firms move, and where do they go?*. Papers in Regional Science, 92(4), 691-713.
- Krugman, P. R.** (1997). Development, geography, and economic theory (Vol. 6). MIT press.
- Lloyd, P. E., & Dicken, P.** (1972). Location in space: a theoretical approach to economic geography. New York: Harper & Row.
- Martin, R.** (2000). Institutional approaches in economic geography. A companion to economic geography, 77-94.
- Mason, C. M.** (1980). Intra-urban plant relocation: a case study of greater Manchester. Regional Studies, 14(4), 267-283.
- Mata, J., & Freitas, E.** (2012). Foreignness and exit over the life cycle of firms. Journal of International Business Studies, 43(7), 615-630.

- McCann, P.** (2001). Urban and regional economics (Vol. 15). Oxford: Oxford University Press.
- Mucchielli J.L., Saucier P.** (1997). European industrial relocations in low-wage countries: Policy and theory debates. In PJ Buckley, & JL Mucchielli (Eds.), *Multinational firms and international relocation*. London: Edward Elgar.
- Nakosteen, R. A., & Zimmer, M. A.** (1987). Determinants of regional migration by manufacturing firms. *Economic Inquiry*, 25(2), 351-362.
- Pellenbarg, P. H., & Kemper, N. J.** (1997). *Industrial mobility in the Netherlands*. SOM Research Report, Groningen.
- Pellenbarg, P. H., Van Wissen, L. J., & Van Dijk, J.** (2002). *Firm relocation: state of the art and research prospects*. Groningen: University of Groningen.
- Pennings, E., & Sleuwaegen, L.** (2000). International relocation: firm and industry determinants. *Economics Letters*, 67(2), 179-186.
- Rosenthal, S. S., & Strange, W. C.** (2003). Geography, industrial organization, and agglomeration. *review of Economics and Statistics*, 85(2), 377-393.
- Schmenner, R. W.** (1980). Choosing new industrial capacity: On-site expansion, branching, and relocation. *The Quarterly Journal of Economics*, 103-119.
- Simon, H. A.** (1955). A behavioral model of rational choice. *The quarterly journal of economics*, 99-118.
- Sleuwaegen, L., & Pennings, E.** (2006). International relocation of production: Where do firms go?. *Scottish Journal of Political Economy*, 53(4), 430-446.
- Tsetsekos, G. P., & Gombola, M. J.** (1992). Foreign and domestic divestments: Evidence on valuation effects of plant closings. *Journal of International Business Studies*, 203-223.

Van Dijk, J., & Pellenbarg, P. H. (2000). Firm relocation decisions in The Netherlands: An ordered logit approach. *Papers in Regional Science*, 79(2), 191-219.

Van Vilsteren, G., & Wever, E. (1999). Business affairs: the attraction and repulsion of firms. *The demography of firms: progress and problems in empirical research. Netherlands Geographical Studies*, (262), 123-140.

Weber, A., & Friedrich, C. J. (1929). Alfred Weber's theory of the location of industries.

Wissen, L. (2000). A micro-simulation model of firms: Applications of concepts of the demography of the firm. *Papers in Regional Science*, 79(2), 111-134.